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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/074,814	02/13/2002	Mitchell J. Hubert	004027.00019	8084
26799	7590	08/25/2006	EXAMINER	
IP LEGAL DEPARTMENT TYCO FIRE & SECURITY SERVICES ONE TOWN CENTER ROAD BOCA RATON, FL 33486				WEBB, GREGORY E
ART UNIT		PAPER NUMBER		
		1751		

DATE MAILED: 08/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/074,814	HUBERT ET AL.	
	Examiner	Art Unit	
	Gregory E. Webb	1751	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 26 May 2006.

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 19-25 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 19-25 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.

4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.

5) Notice of Informal Patent Application (PTO-152)

6) Other: _____.

DETAILED ACTION

Response to Amendment

The following is in response to the applicant's timely filing of an RCE dated 5/26/06.

Based on the applicant's arguments previous rejections based on Sherry '590, Gray '289, and Robbins '728 are hereby withdrawn.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 19-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Blagev, Pavel L. (US6262128).

Concerning the foam, Blagev, Pavel L. teaches the following:

The degree of a thickening effect can also be measured with respect to the ability of the composition to be aerated to a **foam**. In one sense, a **foaming** composition is useful if it can be formed into a **foam**. If a **foaming** composition contains an excessive level of hydrated thickener, the **foaming** composition may achieve a thickness, i.e., viscosity, that will not allow aeration to a useful **foam**. A useful **foam** is one that accomplishes any of the various purposes of such a **foam** composition, e.g., fire extinguishment or prevention, vapor suppression, etc. A **foaming** composition can be considered to contain non-hydrated thickener if the **foaming** composition can be aerated to a useful **foam** even though the **foaming** composition contains a sufficient amount of thickener that if the thickener were fully hydrated the **foaming** composition would not aerate to a useful **foam**. A **foam** need not be uniform to be useful, but, for applications such as the use of a **foam** to extinguish a fire, a **foam** can preferably exhibit a substantially uniform consistency. A **foaming** composition can be considered to contain substantially non-hydrated thickener if the **foaming** composition can be aerated to form a **foam** of an essentially uniform consistency, even though the **foaming** composition contains a sufficient amount of thickener that if the thickener were fully hydrated the **foaming** composition would not aerate to a substantially uniform **foam**. A **foam** that is not substantially uniform due to a high level of hydrated thickener at aeration may contain relatively harder or gelled portions caused by an inability of the **foaming** composition to entrap air by aeration, due to excessive thickness or viscosity of the **foaming** composition. This effect of course can depend on the

aeration equipment that is being used for aeration. It is noted that even though some applications may prefer the production of a substantially uniform **foam**, a **foam** that is not substantially uniform may still be useful in these and in other applications, and it is further noted that the production of a **foam** that may not be substantially uniform is contemplated to be within the scope of the present invention if, as stated *supra*, the foaming composition contains non-hydrated thickener (in any amount) at aeration. (*emphasis added*)

Concerning the drain time, the foam stability and the lifetime of the foam, Blagev, Pavel L. teaches the following:

The 25% Drain Time of a foam was determined by measuring the amount of time required for 25 mL of the 100 mL of liquid in the foam, generated using the Foam Generation Procedure, to **drain** out of the foam. This was done by transferring the generated foam from the blender to a graduated cylinder and noting the time when 25 mL of liquid accumulated in the bottom of the graduated cylinder. (*emphasis added*)

Concerning the aqueous liquid, Blagev, Pavel L. teaches the following:

The state of hydration of thickener in an **aqueous** composition, e.g., whether an amount of thickener is non-hydrated, substantially non-hydrated, or in a state of equilibrated hydration, can be measured by various analyses. As examples of methods that may be used to identify the degree of hydration of an amount of thickener, this may be measured by the extent to which the thickener has caused a thickening effect of the **aqueous** composition, by the amount of time over which the thickener has been exposed to the **aqueous** composition and the water contained therein, or by the extent to which the thickener has dissolved or remains undissolved within the **aqueous** composition. Following are specific examples. (*emphasis added*)

Concerning the water, Blagev, Pavel L. teaches the following:

A foaming composition can be prepared by mixing or combining together its ingredients, e.g., **water**, thickener, and surfactant, plus any additionally desired ingredients. For example, a foaming composition can be prepared by providing **water**, e.g., a fixed amount within a reaction vessel or other container, or preferably a flow of **water** traveling through a hose or pipe, most preferably a hose, and then adding **non-water** ingredients (e.g., surfactant, thickener, etc.) to the **water**. The **non-water** ingredients can be added to the **water** individually or as one or more mixtures, and in any desired order. While both surfactant and thickener can be added to a flow of **water** at any convenient point of the flow, non-hydrated thickener can preferably be added to a flow of **water** at a position near the point of aeration, so that at aeration, as much thickener as possible remains in a non-hydrated state. The residence time of non-hydrated thickener in a foaming composition flowing through a hose, prior to aeration, should be brief enough that the thickener does not become fully hydrated before aeration.

Preferred residence times of the thickener in the foaming composition, prior to

aeration, are sufficiently brief to provide a thickener that is substantially non-hydrated at aeration; examples of particularly preferred residence times can be below about one minute, e.g., 30 seconds, and can most preferably be less than 10 seconds, e.g., 5 seconds, 1 second, or less. (*emphasis added*)

Concerning the hazardous material, spill, hazard and the non-neutral pH, Blagev, Pavel L. teaches the following:

The invention regards chemical compositions that can be aerated to form a foam composition (also referred to as a "foam"). The foam can be used in various applications including any applications understood to be useful in the art of aqueous foam materials. The foam can be useful to contain or suppress volatile, noxious, explosive, flammable, or otherwise **dangerous** chemical vapors. The vapors may evolve from a chemical such as a chemical storage tank, a liquid or solid chemical, or a **chemical spill**. The foam can also be used to extinguish a chemical fire or to prevent ignition or re-ignition of a chemical. These applications will be referred to collectively for purposes of the present description as "application to a chemical" or application to a "liquid chemical." The compositions are especially useful for extinguishing and securing extremely flammable (e.g., having low boiling point and high vapor pressure) and difficult-to-secure chemicals, for example transportation fuels such as methyl t-butyl ether (MTBE) and ether/gasoline blends. Additionally, the foam can be applied to other substrates that are not necessarily **hazardous**, volatile, ignited, or ignitable. As an example, the foam may be applied to land, buildings, or other physical or real property in the potential path of a fire, as a fire break, e.g., to prevent such property from catching fire. (*emphasis added*)

Concerning the foam life, Blagev, Pavel L. teaches the following:

The foam composition can be applied to a variety of substrates, as already stated, including liquid chemicals. The foam can spread quickly as a thick yet mobile blanket over a surface of a liquid chemical, for rapid coverage and/or extinguishment of a fire. In the case of a burning liquid chemical, drainage from the foam composition (i.e., the aqueous phase) can drain and spread as a film over the surface of the liquid chemical which, if the film becomes disturbed or broken, tends to reform to seal vapors (sometimes existing at elevated temperatures) and prevent ignition or re-ignition of the liquid chemical. The foam composition can preferably remain in the form of a foam blanket over the liquid chemical to provide continued vapor suppression and resistance to ignition or re-ignition (i.e., burnback resistance) of the liquid chemical for a significant time after extinguishment. Preferably the foam can remain in a stable, useful foam state for a period of up to and exceeding 24 or even 48 hours after formation, can preferably provide vapor suppression for greater than 6 hours, and can preferably provide resistance to burnback of a chemical fire for over **30 minutes**. (*emphasis added*)

Concerning the foam stabilizer, Blagev, Pavel L. teaches the following:

Preparation of the foam of Comparative Example C1 was repeated, the Foam Expansion was measured, and the **foam stability** was tested by measuring Foam Height initially, at 24 hours, and at 48 hours. Results are shown in Table 4.
(emphasis added)

Claims 19-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Dean, Miles W. (US5406019).

Concerning the foam, Dean, Miles W. teaches the following:

In one embodiment of the invention, the **foaming** surfactant is applied to the hydrocarbon covered substrate prior to the introduction of the activator for the **foam** creating agent. This allows the hydrocarbon to be captured to be soaked with the **foaming** surfactant, thus reducing the viscosity of the material to be removed. The surfactant is then contacted with the **foam** activator, thus trapping the contaminants in the **foam** matrix prior to removal by vacuum. *(emphasis added)*

Concerning the drain, Dean, Miles W. teaches the following:

Separate triggers on each gun allow the operator to control the times of application and relative mix of Component A and Component B being applied to the contaminated substrate. In FIG. 1, there is shown an overlapping fan type spray 50 applied to the oil spill 60. The two components emulsify the spilled petroleum 60, produces a foam trapping the contaminant, and lifting it above the surface in a temporary foam matrix. While trapped in the foam, the petroleum is recovered by conventional industrial vacuum apparatus 70 through vacuum hose 72. If desired, the recovered oil in the vacuum 70 may be transferred to a product separation tank 80 through line 82. There the foam **collapses**, either naturally or through addition of known defoamers. Thus, the volume of contaminated material is very small as compared with prior art sorbent foams and pads which still must be dealt with. In the practice of this invention well known emulsion breaking and oil/water separation technology would be practical for ultimate clean-up. The volume which must be handled is, therefore, much less. *(emphasis added)*

Concerning the aqueous liquid, Dean, Miles W. teaches the following:

Two chemical holding tanks 10 and 20 are used to store the two principal components of the present invention. Holding tank 10 contains and acts as a source of the foaming surfactant and latent foaming agent, collectively called

Component A, which composition will be discussed more fully below. Holding tank 20 contains the activator for the latent foaming agent, usually in an **aqueous** solution for convenience, called Component B. Likewise, the composition of Component B will be discussed more fully below. Component A travels from holding tank 10 through line 12 to a pump 33. The pump 33, which may be powered by either an electric or gas motor with appropriate gearing, or other suitable pump, is used to deliver Component A to the spray gun 43 through line 14. (*emphasis added*)

Concerning the water and the non-neutral pH, Dean, Miles W. teaches the following:

The second stream which would be used, if the latent foaming agent requires a chemical reaction for foam producing conditions, which contains a solution including the activator for the foam to capture the hydrocarbon in the matrix. With respect to one of the carbonate materials, an acid activator would be satisfactory with **acidic** acid preferred because of its ecologically benign nature. Other acids, of course, could be used, but mineral acids form inorganic salts and higher organic acids would produce **water** and soluble materials. The preferred acetic acid in Component B would be present in an amount from about 4% to about 10% by weight in **water**. Of course, if needed, an antifreeze should be present. An especially preferred Component B would include about 5% acetic acid. The amount of Component B can be determined by visually observing the degree of foaming and by adding greater or lesser amounts to contact the substrate, the contaminant and the latent foaming agent. (*emphasis added*)

Concerning the hazardous material, spill and the hazard, Dean, Miles W. teaches the following:

Removal of an accidental oil **spill** from water surfaces or land areas has long been, and will continue to be, a serious problem associated with the production and transportation of oil, and is also a vital enterprise. Although various mechanical devices have been designed to remove oil spread on the surface water, the number of safe methods for removal of oil from land has been limited. Statistics show that only about 10% of the oil **spilled** is recovered using the best technology available. In such a situation, it is particularly important to preserve the ecological balance, so as not to destroy living organisms while cleaning oil contamination. Not only are crude oil and petroleum product **spills** a problem, the environment is also contaminated with many hydrocarbon based **hazardous materials** which were previously in wide use throughout the world, such as diesel fuels, creosote, dioxins, furans and polychlorinated phenols. (*emphasis added*)

Concerning the foam life, Dean, Miles W. teaches the following:

While not wishing to be constrained by theory, it is believed that lifting of the slightly modified crude or refined oil results from an inert gas being evolved and foaming that occurs on the oil surfaces. The **foam life** is normally 20 or more minutes in duration and depends on ambient temperature, wind velocity, and micro-terrain characteristics. Foam life is also dependent upon the relative amounts of the two chemical solutions (Component A and Component B) applied

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to the oil surface. The surface of the oil and the lifting product rises to temperatures of from about 60.degree. F. to about 80.degree. F., depending upon climatic conditions and the natural or man-made substrates present. As discussed above, removal of the foamed oil from the environment is accomplished using normal industrial vacuum equipment or any other convenient removal equipment such as scoops or screens and the like. The foam and associated debris can be transported by vacuum for 100 feet or more depending upon the size, design, and power applied to operate the system. Systems with these characteristics are commercially available and are well known in the art. In fact, suitable vacuum equipment are currently being used to picked up debris both on and off-shore during oil spill remediation operations as well as in normal liquid removal.
(emphasis added)

Claims 19-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Cobb, Daniel S. (US5232632).

Concerning the foam, Cobb, Daniel S. teaches the following:

The spray means herein do not include those that incorporate a propellant gas into the liquid and also do not include those that will **foam** even detergent compositions having a viscosity of less than about 15 cps. However, if a device can be adjusted to either give a liquid spray or a **foam**, said device is included herein only when it is adjusted to give a liquid spray. The spray means herein are typically those that act upon a discrete amount of the composition itself, typically by means of a piston that displaces the composition and expels the composition through a nozzle to create a spray of thin liquid. Surprisingly, it has been found that a slightly thickened, shear-thinning, pseudoplastic aqueous hard surface detergent composition, when expelled through such a means, will form a pattern of **foam** (including mixtures of **foam** and liquid) that has an area that is similar to, or only slightly smaller than, the liquid spray, and with a clearly visible content of **foam**. Preferably the volume of **foam** (and any liquid) that is dispensed is more than about twice, more preferably more than about three times, the volume of the product dispensed. The **foam** acts to define the area covered by the spray and, on vertical surfaces acts to delay the descent of the composition (increased cling time). The additional cling time provides improved cleaning and/or ease of cleaning. *(emphasis added)*

Concerning the aqueous liquid and the non-neutral pH, Cobb, Daniel S. teaches the following:

More specifically, the invention relates to an **aqueous, acidic** hard surface detergent composition comprising: (a) detergent surfactant, preferably a mixture of nonionic and zwitterionic detergent surfactants; (b) optional, but preferred, hydrophobic solvent that provides a primary cleaning function; (c) optional, but

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preferred, polycarboxylate detergent builder; and (d) polymeric, shear-thinning thickener to raise the viscosity of said composition to from about 15 to about 250 cps, said composition having a **pH** of from about 1 to about 5.5. These preferred compositions can also contain an optional buffering system to maintain the **acidic pH** and the balance typically being an **aqueous** solvent system and minor ingredients. (*emphasis added*)

Concerning the water, Cobb, Daniel S. teaches the following:

The balance of the formula is typically **water**. Nonaqueous polar solvents with only minimal cleaning action like methanol, ethanol, isopropanol, ethylene glycol, propylene glycol, and mixtures thereof are usually not present. When the nonaqueous polar solvent is present, the level of nonaqueous polar solvent is from about 0.5% to about 10%, preferably less than about 5%, and the level of **water** is from about 50% to about 97%, preferably from about 75% to about 95%. (*emphasis added*)

Claims 19-25 are rejected under 35 U.S.C. 102(b) as being anticipated by DiMaio, Louis R. (US5133991).

Concerning the foam, DiMaio, Louis R. teaches the following:

The above examples demonstrate that by blending the basic formula and/or other protein **foam** concentrates it is possible to engineer a **foam** with varying properties such as service life, cost, etc. Further, the actual mechanical manipulation of the **foam** solution and air to produce the **foam** blanket can have substantial impact on the life of the blanket. For example, if the **foam** is turbulated and applied directly to the surface without being sprayed over substantial distances, the **foam** tends to last significantly longer due to the energy being expended to propel the **foam** being better utilized to better mix the **foam** solution with air. Also the propelling of the **foam** may actually weaken the blanket in some manner. (*emphasis added*)

Concerning the drain, foam life and the foam stabilizer, DiMaio, Louis R. teaches the following:

In this example, the landfill leachate reservoir was used as a source of 160 gallons of treated (by aeration) leachate (water). This was mixed with 5 gallons of foam concentrate, recirculated to mix and applied as in example 1. The appearance of the foam initially appeared normal, but within 3 to 4 hours of application, run off **drainage** solution was noted. This did not occur with example 1 or 2. 24 hours later the foam blanket had shrunk and the residue was dry and powdery and easily **collapsed** in the wind. This solution may be acceptable where short **foam life** can be tolerated such as for an overnight blanket. Additional life may be possible with

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addition of **foam stabilizers**. Different results can be expected depending on the composition of the leachate. (*emphasis added*)

Concerning the aqueous liquid, DiMaio, Louis R. teaches the following:

In one embodiment the present invention provides a method for covering a substrate having one or more surfaces exposed to the environment to provide a temporary or semipermanent foam barrier layer between the substrate and the environment. This method comprises in combination, the steps of providing an **aqueous** solution or dispersion containing an essentially biodegradable protein base material and one or more foam stabilizing agents; mixing this solution or dispersion with air (as by mechanical manipulation) to produce a foam; and thereafter applying the foam to the exposed surface or surfaces of the substrate to be covered. The foamed surface thus produced may be leveled to produce a substantially uniform layer thickness. (*emphasis added*)

Concerning the water, DiMaio, Louis R. teaches the following:

Further advantages lie in the use of a supply of **water** which is not otherwise generally useful thus conserving the supply of fresh **water** and recycling the leachate. This additionally serves to reduce the cost of supplying the **water** to dilute the concentrate and recycles the **water** to the landfill for further natural biological cleansing. In some instances, the leachate will likely degrade performance of the foam blanket. This can be combatted in many instances by either adding foam stabilizers, diluting the leachate with fresh **water**, increasing the concentration of foam concentrate, or some combination of the above. (*emphasis added*)

Concerning the hazardous material, spill and the hazard, DiMaio, Louis R. teaches the following:

Four gallons of foam concentrate were added to 150 gallons of potable water and 5 gallons of Chubb National Foam Universal Foam Concentrate (a concentrate used as a fire fighting foam and for **hazardous material spill** applications) to produce a 6.25% solution. The solution was mixed and applied to a landfill as in example 1. The resulting foam blanket had a creamy texture but was more elastic in movement and seemed to set more slowly. The foam tended to flow laterally to self level and exhibited normal expansion. Drain off was evident in 3-4 hours by edge wetting. After 24 hours, the surface was dry and powdery on the surface with a moist interior. Wind erosion was noted, but this formulation is adequate for a 24 hour blanket. (*emphasis added*)

Concerning the non-neutral pH, DiMaio, Louis R. teaches the following:

The protein hydrolysate is commercially available as a 35-50% concentrate having a **pH** from approximately 7 to 8 and a specific gravity of 1.148 to 1.152. It can be obtained from any of a number of manufacturers of protein based fire fighting foam or it may be hydrolyzed, as previously described, from the protein found in animal hooves, horns, etc. The concentrate can be made, for example, by lime hydrolysis. (*emphasis added*)

Claims 19-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Stern, Richard M. (US5124363).

Concerning the foam, aqueous liquid and the non-neutral pH, Stern, Richard M. teaches the following:

For a preferred gelled **foam** system based on guar gum or hydroxypropyl guar gum as the polyhydroxy polymer and borax as the crosslinking agent, an **aqueous** solution having a **pH** of about 9 to 10.5, preferably 9 to 10 (which **alkaline pH** control can be obtained by adding appropriate amounts of a base, e.g. NaOH, Na₂CO₃, or NH₄OH), containing 0.2 to 2 weight percent, preferably 0.5 to 1 weight percent, of the gum, and containing 0.2 to 0.5 weight percent of a surfactant as a **foaming** agent, can be gelled with borax, using a borax:gum weight ratio of 1:20 to 1:1, preferably 1:10 to 1:5. In preparing the **foamable, aqueous** solution or dispersion for this **foam** system, the borax is added to the formulation after the guar component has been in contact with the water of the formulation for a residence hydration time of 15 to 600 seconds or as long as 3 hours or longer, preferably at least 30 seconds. If the hydration time is less than 15 seconds, the solution or dispersion generally does not readily gel. If the **pH** of the **foamable aqueous** solution or dispersion is **alkaline** but lower than about 9, the solution or dispersion will generally gel before **foaming** or before sufficient air is entrained. If the **pH** is greater than about 10.5, the desired gelation or viscosity-buildup may be too long or not occur. (*emphasis added*)

Concerning the drain, water and the hazardous material, Stern, Richard M. teaches the following:

The foam as prepared and applied is initially a fluid, two phase-system (an agglomeration of air bubbles) of a discontinuous or dispersed gas phase, viz. air, and a continuous, aqueous, polymer liquid phase, viz. bubble walls or lamellae, comprising **water** in which is dissolved or dispersed small amounts of polyhydroxy polymer, foaming agent, pH modifier, and the complexing agent such as the disassociated or ionized polyprotic inorganic acid salt. The **water** of the liquid phase can also contain dissolved or dispersed optional components, such as rubber or polymeric latex particles, fire retardant, pigment, dye, etc. The liquid phase of the foam is the major or predominant phase by weight. Upon or following application of the fluid foam to the **hazardous material** or substrate, and as a consequence of the crosslinking of the polyhydroxy polymer by the complexing agent, the three-dimensional structure of applied fluid air foam is thus stabilized in said time-controlled manner in the form of either a non-fluid, gelled, aqueous air foam or a viscous, aqueous air foam. The gelled air foam is a two-phase system of discontinuous gas (air) phase and a continuous, soft, semi-solid hydrogel phase comprising bound **water** and **water-insoluble**, crosslinked,

hydrated polyhydroxy polymer. The viscous air foam is a two-phase system of discontinuous gas (air) phase and continuous aqueous polymer phase comprising **water** and polyhydroxy polymer. The polymer in both the gelled and viscous foams comprises a plurality of hydrated diol-containing polymer chains. The gelled or viscous phase is the major or predominant phase by weight. The lamellae or liquid film of the air bubbles in the applied fluid foam is gelled, or becomes viscous, thus minimizing, reducing, or preventing the **drainage** of liquid from the lamellae and the consequent rupture of the bubbles and **collapse** of the foam structure. Due to the hydrophilic nature of the polyhydroxy polymer, **water** in the foam is retained or bound and the **water**, together with the highly vapor-impermeable nature of the resulting gelled or viscous foam, provides a stable, persistent or long-lasting, sealing or vapor suppressing blanket or barrier on the exposed, treated surface of the **hazardous material** or substrate. Such a foam blanket excludes oxygen or air from the treated **hazardous material**, or lowers the vaporization rate of liquid in the **hazardous material** or substrate so-treated, and greatly facilitates clean-up procedures, such as excavation and hauling of excavated material by reducing the risk of ignition of flammable vapors or other combustible material, reducing the concentration of toxic vapors in the work area, and reducing the environmental impact of the **hazardous material**. For purposes of clean-up, the applied foam in the case of borate-crosslinked polymer, after it serves its purpose, can be sprayed or otherwise treated with a foam-collapsing or -breaking agent, such as dilute aqueous acid, the "reversible" nature of such a foam system being an important and useful property thereof. (*emphasis added*)

Concerning the spill and the hazard, Stern, Richard M. teaches the following:

The **hazardous** materials which can be treated or controlled with the foam in accordance with this invention include the various materials present in **hazardous** waste sites described at the beginning of this specification, such as land burial dumps, impoundments, and lagoons. Such materials can be organic or inorganic liquids, semi-liquids, or solids, such as synthetic or natural organic chemicals, heavy or toxic metals, solvents, effluents, household garbage and trash, discarded products, spent raw materials, contaminated containers, sludges, mill tailings, burn residues, contaminated soils, flammable and volatile liquids, etc., disposed in such sites from industrial and commercial operations, etc. Such wastes can be toxic, noxious, ignitable, flammable, combustible, corrosive, or **dangerously** reactive. The body of such materials can be treated *in situ* with the foam or as excavated or removed from such sites. Spills or **leaks** of **hazardous** liquids from pipelines or containers such as tanks or vehicles can also be treated. (*emphasis added*)

Concerning the foam stabilizer, Stern, Richard M. teaches the following:

Optional components of the foam systems of this invention include: **foam stabilizers**, such as ethylene glycol, diethylene glycol, glycerol, ethyl CELLOSOLVE.RTM., and butyl CARBITOL.RTM.; foam tougheners and shrink control agents, such as aqueous rubber or polymeric latices, e.g. styrene-butadiene

rubber latices, poly(chloroprene) rubber latices, poly(chloroprene-co-methacrylic acid) rubber latices, and the polymer latices described in U.S. Pat. No. 4,315,703; dyes, and pigments, such as titanium dioxide; fire retardants, such as diammonium phosphate, ammonium phosphate, ammonium sulfate, and ammonium polyphosphate; and other additives or components such as electrolytes, corrosion inhibitors, and biocides. Such optional components should be compatible with the other components in the systems and are used in amounts which do not disadvantageously affect the desired properties, such as foamability, and function, such as the sealing capability, of the foam system. The total amount of solids attributable to said optional components in the case of the foam systems will be such that the aqueous solution or dispersion is still foamable and the density of the foam prepared therefrom is less than 1 g/cc. Generally, the amount of solids attributable to said optional components will be less than about 40 weight percent, preferably less than about 30 weight percent, of the foamable aqueous solution or dispersion. (*emphasis added*)

It should be noted that the foam life of the Stern reference are on the orders of hours and possibly days. For example table 4 shows the suppression of vapors using the foam and the ability of the foam to suppress these vapors for over 75 minutes. Thus these foams would inherently meet the limitations of claims 22-25.

Claims 19-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Alm, Roger R. (US4923903).

Concerning the foam, aqueous liquid and the water, Alm, Roger R. teaches the following:

The dyed or colored, **aqueous** fluid **foams** of this invention can be generated by the following procedure. Solutions of the gelling or viscosity-increasing agent in **water-soluble** organic solvents, e.g., acetone or methyl ethyl ketone, or in **water-soluble** or -dispersible organic solvents, e.g., dibutyl phthalate, or as solutions in a blend of solvents, are mixed with an **aqueous** solution containing surfactant and polyamine in the desired ratio, e.g., with a proportioning apparatus. The resulting dyed or colored, **aqueous**, **foamable** solution is sprayed under pressure through a **foam**-generating nozzle, such as an air-injecting or air-aspirating nozzle, to generate the dyed or colored, fluid **aqueous foam**. Gelation time of the dyed or colored, **aqueous foam**, or the time at which it reaches its desired increase in viscosity, can be controlled by the proper selection and concentration of the gelling or viscosity-increasing agent, **aqueous foaming agent**, **water-soluble**

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polyamine, chain extending agents, cross-linking agents, urea-forming catalyst and aqueous foaming agent, and chain terminating agents such as monofunctional amines. (*emphasis added*)

Concerning the drain, hazardous material and the non-neutral pH, Alm, Roger R. teaches the following:

The dyed or colored polyurea polymer in both the dyed or colored, gelled and dyed or colored, viscous foams comprises, like the precursor prepolymer, a plurality of poly(oxyalkylene) chains, the oxyethylene content being sufficient to render the polymer hydrophilic. The gelled or viscous phase of the foam is the major or predominant phase by weight of the dyed or colored, aqueous air foam. The lamellae or liquid film of the air bubbles in the applied, dyed or colored fluid foam is gelled, or becomes viscous, thus minimizing, reducing, or preventing the drainage of liquid from the lamellae and the consequent rupture of the bubbles and collapse of the foam structure. Due to the hydrophilic nature of the dyed or colored, polyurea polymer, water in the foam is retained or bound, and it, together with the closed cell nature of the resulting dyed or colored, gelled or viscous foam, provides a stable, persistent or long-lasting, sealing or vapor suppressing blanket or barrier on the exposed, treated surface of the **hazardous material** or substrate to which the foam is applied. (*emphasis added*)

Concerning the spill and the hazard, Alm, Roger R. teaches the following:

The **hazardous** materials which can be treated or controlled with the foam in accordance with this invention include the various materials present in sanitary landfills and **hazardous** waste sites described at the beginning of this specification, such as land burial dumps, impoundments, and lagoons. Such materials can be organic or inorganic liquids, semi-liquids, or solids, such as synthetic or natural organic chemicals, heavy or toxic metals, solvents, effluents, household garbage and trash, discarded products, spent raw materials, contaminated containers, sludges, mill tailings, burn residues, contaminated soil, flammable and volatile liquids, etc., disposed in such sites from industrial and commercial operations, etc. Such wastes can be toxic, noxious, ignitable, flammable, combustible, corrosive, or **dangerously** reactive. The body of such materials can be treated in situ with the dyed or colored foam or as excavated or removed from such sites. Spills or **leaks** of **hazardous** liquids from pipelines or containers such as tanks or vehicles can also be treated. (*emphasis added*)

Concerning the foam stabilizer, Alm, Roger R. teaches the following:

Optional components of the dyed or colored foam systems of this invention include: polymeric stabilizers and thickeners such as polysaccharides, partially hydrolyzed protein, starches, polyvinyl resins, e.g. polyvinyl alcohol and polyacrylamides, carboxyvinyl polymers, and poly(oxyethylene) glycol; **foam stabilizers** such as ethylene glycol, diethylene glycol, glycerol, ethylene glycol monoethyl ether, and diethylene glycol monobutyl ether; foam tougheners and shrink control agents, such as aqueous rubber or polymeric latices, e.g. styrene-

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butadiene rubber latices, poly(chloroprene) rubber latices, poly(chloroprene-co-methacrylic acid) rubber latices, and the polymer latices described in said U.S. Pat. No. 4,315,703; and other additives or components such as electrolytes, corrosion inhibitors, and biocides. Such optional components should be compatible with the other components in the dyed or colored foam systems and are used in amounts which do not disadvantageously affect the desired properties, such as foamability, function, e.g. sealing capability, and color of the foam system. (*emphasis added*)

Alm provides examples where the color stability of the foam is measured in hours and would thus meet the applicant's limitations of claims 22-25.

Claims 19-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Alm, Roger R. (US4795764).

Concerning the foam and the drain, Alm, Roger R. teaches the following:

The surfactants, or surface active agents, useful as foaming agents in the practice of this invention to make the foamed polyurea products are synthetic or natural organic compounds or materials capable of foaming water, which are compatible with the polyamine-reactive poly(oxyalkylene) isocyanate-terminated prepolymer. Those surfactants which are preferred are those sometimes characterized as capable of forming "strongly foaming solutions", e.g., see "Foams", J.J. Bikerman, published by Springer-Verlag, New York, Inc., pages 108-132 (1973). The usefulness of a surfactant, and its amount, for purposes of this invention, can be determined by the foam volume or height and its resistance to collapse. Generally, the applicable surfactant and amount thereof useful in producing the foams of this invention will yield a foam volume (or height) at least one-and-a-half, and preferable at least twice, that of the foamable aqueous solution, a simple test for this purpose being the shaking by hand of the solution in a suitable closed container. For example, 100 g of such solution is vigorously shaken 25 times in a 480 cc, or larger, closed glass jar or a calibrated vessel, and the height of the resulting foam vis-a-vis the height of the solution before shaking is measured, the ratio of foam height to solution height being the expansion value. (*emphasis added*)

Concerning the aqueous liquid and the water, Alm, Roger R. teaches the following:

The aqueous fluid foams of this invention can be generated by the following procedure. Solutions of the hydrophilic aliphatic isocyanato-terminated poly(oxyalkylene) prepolymers in water-soluble organic solvents, e.g., acetone or methyl ethyl ketone, or in water-soluble or dispersible organic solvents, e.g.,

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dibutyl phthalate, or as solutions in a blend of solvents, are mixed with an **aqueous** solution containing surfactant and polyamine in the desired ratio, e.g., with a proportioning apparatus. The resulting **aqueous**, foamable solution is sprayed under pressure through a foam-generating nozzle, preferably an air-aspirating nozzle, to generate the fluid **aqueous** foam. Gelation time of the **aqueous** foam, or the time at which it reaches its desired increase in viscosity, can be controlled by the proper selection and concentration of the reactive prepolymer, polyamine and optional chain terminating agents such as monofunctional amines. (*emphasis added*)

Concerning the hazardous material, spill, hazard and the non-neutral pH, Alm, Roger R. teaches the following:

The fluid, water-based, aerated or air-entrained, closed cell, low density foam (or air foam) can be sprayed or otherwise applied as a wet, three-dimensional coating, blanket, or layer to exposed surface of a substrate, such as a body of **hazardous material**, for example a **hazardous** waste dump or a pool of a **spilled**, volatile, flammable liquid, the applied foam gelling, or increasing in viscosity without gelling, and thus stabilizing *in situ* and forming a wet, persistent or long-lasting, sealing or vapor suppressing, closed cell, hydrogel air foam, or a viscous, water-containing air foam, in the form of a coating, blanket, or layer on the substrate. Such a coating results in minimizing, suppressing, controlling, reducing or preventing the emission, spreading, or release of gases, vapors, odors, dusts, or liquids that may be present in the **hazardous material** or substrate and physically immobilizing, constraining, consolidating, sealing, or inactivating the exposed surface so coated. (The term "air foam" is used in its industry-accepted sense to mean a foam made by physically mixing air into a liquid, and thus the term is distinct from chemical or carbon dioxide foam or halocarbon blown foam.) (*emphasis added*)

Concerning the foam life, Alm, Roger R. teaches the following:

TABLE 5	Time to gelation	Ex. C17, Ex.
20, Comparative Prepolymer:water	Prepolymer Prepolymer ratio (by vol.)	Solution A'
Solution	6:94 > 24 hours*	70 seconds 12:88 >
24 hours*	50 seconds 25:75	60 minutes 45 seconds 50:50 20 minutes 65 seconds 75:25
60 minutes	165 seconds 88:12 ca. 8 hours	420 seconds

*These dilute aqueous Prepolymer Solutions

A' lost isocyanate reactivity after about 1 hour.

(*emphasis added*)

Concerning the foam stabilizer, Alm, Roger R. teaches the following:

Commercial foam stabilizing products, e.g. 3M Foam Stabilizer FX-9161 in combination with 3M Foam Concentrate FX-9162, of the type described by Kent et al. for suppressing a wide variety of flammable liquids, dusts, odors, solid particulates, ordinary combustible materials, etc., are described in product

bulletins of the 3M Company, viz., bulletins 98-0211-2614-3 (471.5) 11 and 98-0211-2615-0 (472) 11 issued March, 1987. (*emphasis added*)

Claims 19-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Berger, Thomas W. (US4795590).

Concerning the foam, aqueous liquid and the water, Berger, Thomas W. teaches the following:

The apparatus used in this example to make and apply **foam** to the pits was that proportioning, **foam** generating, and **foam** application apparatus described hereinbefore. The air pressure of the vessel containing the tank of gelling agent and tank of solvent was 0.34 MPa, and the air pressure of the vessel containing the tank of surfactant solution was 0.69 MPa. The gear pump and the appropriate valves were adjusted to deliver via a 7.6 LPM (liters per minute) air-aspirator nozzle either Comparison Foam A, a 6% **aqueous** solution of LIGHT WATER AFFF/ATC FC-600 **foaming** agent, or Invention Foam B, a blend of said 6% **aqueous** solution of **foaming** agent and Prepolymer C (see Example 55), to yield a gelable **foam** composition containing 4.91% gelling agent solids and about 95 wt. % **water**. The expansion value of both resulting **foams** was about 6. (*emphasis added*)

Concerning the slow draining and the drain, Berger, Thomas W. teaches the following:

These examples show viscous, **slow draining**, fluid foams or gelled foams of this invention can be made without gelling or with various gel times depending on the amount of reactive prepolymer in the foam system, such foams having **slow drainage** or no **drainage**. Where too low a concentration of prepolymer was used, gelation did not occur, but the **drainage** rates of the non-gelled, fluid foams were lowered due to an increase in viscosity of the foam. Results are shown in Table IV. (*emphasis added*)

Concerning the hazardous material, spill and the hazard, Berger, Thomas W. teaches the following:

The gelled foams produced in Examples 42-45, using methanol or monofunctional amines in the formulation, were pourable and easily dispersed with a stream of tap water, yet all showed negligible liquid drainage after several days on the shelf. Such easily dispersible foam is useful in suppression of **hazardous liquid spills**, since the foam can be washed away with water several hours after use, e.g., with a stream of water from a fire hose. (*emphasis added*)

Concerning the non-neutral pH, Berger, Thomas W. teaches the following:

The foam as prepared and applied is initially a fluid, two phase-system (an agglomeration of air bubbles) of a discontinuous or dispersed gas phase, viz., air,

and a continuous, aqueous, polymer liquid phase, viz., bubble walls or lamellae, comprising water in which is dissolved or dispersed small amounts of organic material, namely surfactant foaming agent and water-reactive, hydrophilic poly(oxyalkylene) polyisocyanate polymer gelling or viscosity-increasing agent, the poly(oxyalkylene) portion of which contains sufficient oxyethylene units, -- CH_{sub.2} CH_{sub.2} O--, to render the polymer water-soluble and hydrophilic. The water of the liquid phase can also contain optional components, such as rubber or polymeric latex particles. The liquid phase of the foam is the major or predominant phase by weight. Upon or following application of the fluid foam to the hazardous material or substrate, the isocyanate groups of the water-reactive polymer react in situ with a stoichiometric amount of the water in the foam to form a chain-extended or crosslinked, hydrophilic, polyurea polymer and carbon dioxide gas (essentially or practically all of which gas apparently dissolves in the unreacted or bulk water and thus does not significantly foam the water). As a consequence of the polymerization of the water-reactive polymer, the three-dimensional, closed cell structure of applied foam is thus stabilized in the form of either a non-fluid, gelled air foam or a viscous air foam. The gelled air foam is a two-phase system of discontinuous gas (air) phase and a continuous, soft, semi-solid hydrogel phase comprising bound water and water-insoluble polyurea polymer. The viscous air foam is a two-phase system of discontinuous gas (air) phase and continuous aqueous polymer phase comprising water and polyurea polymer. The polyurea polymer in both the gelled and viscous foams comprises a plurality of said poly(oxyalkylene) chains, the oxyethylene content being sufficient to render the polymer hydrophilic. The hydrogel or viscous phase is the major or predominant phase by weight. The lamellae or liquid film of the air bubbles in the applied fluid foam is gelled, or becomes viscous, thus minimizing, reducing, or preventing the drainage of liquid from the lamellae and the consequent rupture of the bubbles and collapse of the foam structure. Due to the hydrophilic nature of the polyurea polymer, water in the foam is retained or bound and it, together with the closed cell nature of the resulting gelled or viscous foam, provides a stable, persistent or long-lasting, sealing or vapor suppressing blanket or barrier on the exposed, treated surface of the hazardous material or substrate. Such a foam blanket excludes oxygen or air from the treated hazardous material, or lowers the vaporization rate of liquid in the hazardous material or substrate so treated, and greatly facilitates clean-up procedures such as excavation and hauling of excavated material by reducing the risk of ignition of flammable vapors, reducing the concentration of toxic vapors in the work area, and reducing the environmental impact of the hazardous material. (*emphasis added*)

Concerning the containment, Berger, Thomas W. teaches the following:

This example illustrates the effective use of a gelled foam of this invention in the **containment** of flammable liquid and suppression of its vapors emitted from a simulated hazardous waste site, namely sand saturated with an organic solvent. (*emphasis added*)

Concerning the foam life, Berger, Thomas W. teaches the following:

After various time intervals, i.e., 5 minutes, **30 minutes**, and 48 hours, the articles embedded in the gelled foam were lifted by hand. In each case, the cup and gelled foam contents were raised along with the lifted article, indicating good adhesion of the gelled foams to each of the articles. (*emphasis added*)

Concerning the foam stabilizer, Berger, Thomas W. teaches the following:

Optional components of the foam systems of this invention include: polymeric stabilizers and thickeners such as polysaccharides, partially hydrolyzed protein, starches, polyvinyl resins, e.g. polyvinyl alcohol and polyacrylamides, carboxyvinyl polymers, and poly(oxyethylene) glycol; **foam stabilizers** such as ethylene glycol, diethylene glycol, glycerol, ethyl CELLOSOLVE, and butyl CARBITOL; foam tougheners and shrink control agents, such as aqueous rubber or polymeric latices, e.g. styrene-butadiene rubber latices, poly(chloroprene)rubber latices, poly(chloroprene-co-methacrylic acid) rubber latices, and the polymer latices described in said U.S. Pat. No. 4,315,703; and other additives or components such as electrolytes, corrosion inhibitors, and biocides. Such optional components should be compatible with the other components in the foam systems and are used in amounts which do not disadvantageously affect the desired properties, such as foamability, and function, such as the sealing capability, of the foam system. The total amount of solids attributable to said optional components will be such that the aqueous solution is still foamable and the density of the foam prepared therefrom is less than 1 g/cc. Generally, the amount of solids attributable to said optional components will be less than about 40 weight percent, preferably less than about 30 weight percent, of the foamable aqueous solution. (*emphasis added*)

Conclusion

The remainder of the references cited are merely for illustrating the state of the art in foams.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregory E. Webb whose telephone number is 571-272-1325. The examiner can normally be reached on 9:00-17:30 (m-f).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglass McGinty can be reached on (571)272-1029. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Gregory E. Webb
Primary Examiner
Art Unit 1751

gew